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IS 6769-2 (1972): Direct Reading Pointer Indicator Type AC Electronic Millivoltmeter, Part 2: With a Frequency Range of 2 Hz to 1 Mhz [LITD 8: Electronic Measuring Instruments, Systems and Accessories]



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IS : 6769 (Part II) - 1972

Indian Standard

SPECIFICATION FOR
DIRECT READING POINTER INDICATOR
TYPE AC ELECTRONIC MILLIVOLTMETER

PART II WITH A FREQUENCY RANGE OF 2 Hz TO 1 MHz

UDC 621.317.725:621.38



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May 1973

Indian Standard

SPECIFICATION FOR DIRECT READING POINTER INDICATOR TYPE AC ELECTRONIC MILLIVOLTMETER

PART II WITH A FREQUENCY RANGE OF 2 Hz TO 1 MHz

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*Shri Y. Venkataramiah was Chairman for the meeting in which this standard was finalized.

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Indian Standard

SPECIFICATION FOR DIRECT READING POINTER INDICATOR TYPE AC ELECTRONIC MILLIVOLTMETER

PART II WITH A FREQUENCY RANGE OF 2 Hz TO 1 MHz

0. FOREWORD

0.1 This Indian Standard (Part II) was adopted by the Indian Standards Institution on 7 December 1972, after the draft finalized by the Electronic Equipment Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 The provisions of this standard apply to the complete apparatus and not to component parts thereof.

0.3 This standard should be used in conjunction with IS : 6769 (Part I) - 1972* and IS : 3437-1972†.

0.4 Assistance has been derived from the following while preparing this standard:

IEC Pub 217 (1967) Electronic voltmeters. International Electrotechnical Commission.

BS 4205:1967 Specification for electronic voltmeters. British Standards Institution.

0.5 This standard is one of a series of Indian Standards on electronic measuring equipment. A list of standards so far published in this series is given on fourth cover page.

0.6 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960‡. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Specification for direct reading pointer indicator type ac electronic millivoltmeter: Part I Methods of measurements.

†General requirements for direct reading pointer indicator type electronic voltmeter (first revision).

‡Rules for rounding off numerical values (revised).

IS : 6769 (Part II) - 1972

1. SCOPE

1.1 This standard (Part II) lays down the minimum performance requirements and characteristics to be specified for direct reading pointer indicator type ac electronic millivoltmeter for the measurement of alternating voltages in the frequency range of 2 Hz to 1 MHz.

1.1.1 The climatic and mechanical durability requirements of these millivoltmeters are under consideration.

2. TERMINOLOGY

2.0 For the purpose of this standard the definitions and explanation of terms specified in 2 of IS : 3437-1972* shall apply.

3. CONSTRUCTIONAL REQUIREMENTS

3.1 The provisions of 3 of IS : 3437-1972* shall apply as modified by **3.1.1**.

3.1.1 The panel-meter shall have a minimum 100 divisions, each division being of 0.8 mm width.

4. WORKMANSHIP AND FINISH

4.1 The provisions of 5 of IS : 3437-1972* shall apply.

5. CONTROLS AND ADJUSTMENTS

5.1 The provisions of 6 of IS : 3437-1972* shall apply.

6. POWER SUPPLY

6.1 The provisions of 7 of IS : 3437-1972* shall apply.

7. CHARACTERISTICS OF ELECTRONIC VOLTMETERS

7.1 Basic Characteristics

7.1.1 Accuracy Class — The accuracy classes covered in this standard are 1.5, 2.5 and 5 (see also **2.8.2** and **4.1** of IS : 3437-1972*).

7.1.2 Permissible Intrinsic Error — The permissible intrinsic error under reference conditions and between the limits of the effective range shall be one of the following:

- ± 1.5 percent
- ± 2.5 percent
- ± 5 percent

*General requirements for direct reading pointer indicator type electronic voltmeter (first revision).

7.1.3 Voltage Ranges — The instrument shall be capable of measuring ac voltages from 10 mV full scale deflection up to 100 V full scale deflection in suitable ranges. The instrument may also be calibrated in decibels and a separate decibel scale shall be provided.

7.1.3.1 The rating of effective ranges shall preferably be chosen from the following basic series or their decimal multiples or fractions (see 3.4.1 of IS : 3437-1972*).

- a) 1, $\sqrt{10}$, 10 (for voltage and dB); and
- b) 1, 3, 10 (for voltage).

7.1.4 Calibration — The calibration shall be for rms values. If it is otherwise, such as peak, average or logarithmic, it shall be indicated on the instrument.

7.1.5 Type of Input — The type of input shall be single ended. Other types of input, such as symmetrical or differential may be provided.

7.1.6 Input Impedance — The input impedance expressed in terms of its equivalent parallel resistive and reactive components shall be as follows:

Input resistance — 1 M Ω , *Min*

Input capacitance — 25 pF, *Max*

7.1.7 Warm-Up Period — The time taken by the instrument to attain stability within the permissible intrinsic error specified shall not be greater than 15 minutes.

7.2 Other Characteristics

7.2.1 Variation in Indication — Permissible variation in indication for the three classes of voltmeters covered by this standard (see 7.1.1) shall be as specified in Table 1 for various influence quantities.

7.2.2 Damping — The damping of a voltmeter characterised by its overshoot and settling time shall be measured in accordance with 9 of IS : 6769 (Part I)-1972† and shall satisfy the following requirements:

- a) *Overshoot* — Under the test conditions, the overshoot shall not exceed the upper limit of effective range.
- b) *Settling time* — Under the test conditions, the time required for the index to attain its final steady position within 1.5 percent of the upper limit of the effective range shall not exceed 4 seconds.

*General requirements for direct reading pointer indicator type electronic voltmeter (first revision).

†Specification for direct reading pointer indicator type ac electronic millivoltmeter; Part I Methods of measurements.

TABLE 1 VARIATION IN INDICATION

(Clause 7.2.1)

| INFLUENCING QUALITY | CL REF OF IS : 6769 (Part I) - 1972* | VARIATION IN INDICATION | | |
|---|---|-------------------------------|-------------------------------|-------------------------------|
| | | Class Index 1.5 percent | Class Index 2.5 percent | Class Index 5.0 percent |
| a) Position | 5.5 | ± 1.5 | ± 2.5 | ± 5.0 |
| b) Ambient temperature change | 5.6 | ± 1.5 | ± 2.5 | ± 5.0 |
| c) External magnetic field: | 11 | | | |
| 1) When specified by the manufacturer | | ± 1.5 | ± 2.5 | ± 5.0 |
| 2) At 0.5 millitesla (when not specified by the manufacturer | | ± 3.0 | ± 3.0 | ± 3.0 |
| d) External electric field | 12 | Under | consideration | |
| e) External RF electromagnetic field | 13 | Under | consideration | |
| f) Supply voltage change: | 5.3 | | | |
| 1) First sudden 5 percent variation (maximum variation) | | ± 0.75 | ± 1.25 | ± 2.5 |
| 2) Second sudden 5 percent variation (final variation) | | ± 0.75 | ± 1.25 | ± 2.5 |
| g) Super-imposed ac input voltage | 5.4 | ± 1.5 | ± 2.5 | ± 5.0 |
| NOTE — The maximum voltage applied shall not exceed insulation voltage of the instrument. | | | | |
| h) Frequency of measured voltage: | 7 | | | |
| 1) Over 10 Hz to 100 kHz | | ± 1.5 | ± 2.5 | ± 5 |
| 2) Over 2 Hz to 1 MHz | | ± 3 | ± 5 | ± 10 |
| j) Swinging | 8 | ± 1.5 | ± 2.5 | ± 5.0 |
| k) Fluctuation (random and spurious variation) | 5.1 | ± 0.75 | ± 1.25 | ± 2.5 |
| m) Drift | 5.2 | ± 1.5 | ± 2.5 | ± 5.0 |

*Specification for direct reading pointer indicator type ac electronic millivoltmeter: Part I Methods of measurements.

7.2.3 Errors Due to Overload

7.2.3.1 After being subjected to the continuous overload test in accordance with **10.1** of IS : 6769 (Part I)-1972*, the voltmeter shall comply with the requirements of its specified accuracy.

7.2.3.2 After being subjected to the test for overload for short duration in accordance with **10.2** of IS : 6769 (Part I)-1972*, the voltmeter shall comply with the requirements of its specified accuracy.

8. MARKING

8.1 The provision of **8** of IS : 3437-1972† shall apply in addition to **8.1.1**.

8.1.1 The instrument may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

9. TECHNICAL DOCUMENTATION TO BE SUPPLIED WITH THE INSTRUMENT

9.1 The provision of **9** of IS : 3437-1972† shall apply.

*Specification for direct reading pointer indicator type ac electronic millivoltmeter: Part I Methods of measurements.

†General requirements for direct reading pointer indicator type electronic voltmeter (first revision).

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ON

ELECTRONIC MEASURING EQUIPMENT

IS:

- 2320-1963 Methods of measurements for amplitude modulated radio frequency signal generators (30 kc/s to 30 Mc/s)
- 2321-1963 Requirements for general purpose amplitude modulated radio frequency signal generators (30 kc/s to 30 Mc/s)
- 2711-1966 Direct reading pH meters (*revised*)
- 3437-1972 General requirements for direct reading pointer indicator type electronic voltmeter (*first revision*)
- 3686-1966 Minimum requirements for general purpose audio frequency signal generators (30 c/s to 30 kc/s)
- 3915-1966 Methods of measurements on audio frequency signal generators (30 c/s to 30 kc/s)
- 4309-1967 Methods of measurements on direct reading pH meters
- 4330-1967 Methods of measurements on cathode-ray oscilloscope (dc to 10 Mc/s)
- 6700-1972 Requirements for general purpose cathode-ray oscilloscope
- 6756-1972 Technical documentation to be supplied with electronic measuring equipment
- 6767 (Part I)-1972 Direct reading pointer indicator type ac/dc electronic voltmeter: Part I Methods of measurements
- 6767 (Part II)-1972 Direct reading pointer indicator type ac/dc electronic voltmeter: Part II Up to 30 MHz
- 6767 (Part III)-1972 Direct reading pointer indicator type ac/dc electronic voltmeter: Part III Up to 300 MHz
- 6769 (Part I)-1972 Direct reading pointer indicator type ac electronic millivoltmeter: Part I Methods of measurements
- 6769 (Part II)-1972 Direct reading pointer indicator type ac electronic millivoltmeter: Part II With a frequency range of 2 Hz to 1 MHz
- 6804-1972 Glass electrodes for direct reading pH meters

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